U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB-276 073

Environmental Protection Agency 1981-1990 ADP Requirements Study. Consolidated Telecommunications Study. Volume I. Executive Management Summary

Informatics, Inc, Rockville, Md.

Prepared for

Environmental Protection Agency, Washington, D.C.

14 Dec 77

PORTIONS OF THIS REPORT ARE NOT LEGIBLE.
HOWEVER, IT IS THE BEST REPRODUCTION
AVAILABLE FROM THE COPY SENT TO NTIS

ENVIRONMENTAL PROTECTION AGENCY
1981 – 1990 ADP REQUIREMENTS STUDY

Consolidated Telecommunications Study

Volume I

Executive Management Summary

Prepared For:

Environmental Protection Agency

Management Information and Data Systems Division

Washington, D. C. 20460

Informatics Inc
6000 Executive Boulevard
Rockville
Maryland 20852
(301) 770 3000

BIBLIOGRAPHIC DATA SHEET	1. Report No. EPA-MIDS-15	2.	3. Recipient's Accession No. PB276073

4. Title and Subtitle
Environmental Protection Agency
1981-1990 ADP Requirements Study
Consolidated Telecommunications Study
Volume I Executive Management Summary

5. Report Date: December 14, 1977

6.

7. Author(s): Informatics, Inc.

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Informatics, Inc.
6000 Executive Boulevard
Rockville, Md. 20852

10. Project/Task/Work Unit No.

11. Contract/Grant No.
GS-03S-46908

12. Sponsoring Organization Name and Address
Environmental Protection Agency
Management Information and Data Systems Division (PM-218)
Washington, D.C. 20460

13. Type of Report & Period Covered
Final

14. (13) 5aa/24

15. Supplementary Notes
EPA Project Director: Theodore R. Harris (see Item 12 for address)

16. Abstracts
The purpose and objectives of the Environmental Protection Agency (EPA) Automated Data Processing (ADP) planning activities are to obtain the most cost-effective computing/telecommunications resources to meet EPA's computing requirements for the 1981 through 1990 time period. A detailed system study was performed, which identifies the current and projected ADP requirements for the period 1981 through 1990. Each ADP activity is identified utilizing Zero Based Budget (ZBB) decision units and then projected utilizing a multiple scenario approach. The final documents of this report are:

Consolidated Systems Study: Volume I - Executive Management Summary; Volume II - Detailed Report; Volume III - Appendices including microfiche details (3) fiche.
Consolidated Telecommunications Study: Volume I - Executive Management Summary; Volume II - Detailed Report; Volume III - Appendices including microfiche details (6) fiche.
Conversion Study: Volume I - Final Report

17. Key Words and Document Analysis. 17a. Descriptors
ADP Requirements Study
Feasibility Study
Zero Based Budget (ZBB)
Futures Planning
Multiple Scenario Approach
Telecommunications Study
ADP Planning
Telecommunications Planning

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group

18. Availability Statement: Release Unlimited	19. Security Class (This Report): UNCLASSIFIED	21. No. of Pages: 34
	20. Security Class (This Page): UNCLASSIFIED	22. Price: A03 - A01

FORM NTIS-35 (REV. 10-73) ENDORSED BY ANSI AND UNESCO. THIS FORM MAY BE REPRODUCED USCOMM-DC 8265-P74

ENVIRONMENTAL PROTECTION AGENCY

1981-1990 ADP REQUIREMENTS STUDY

CONSOLIDATED TELECOMMUNICATIONS STUDY

VOLUME I

Executive Management Summary

Final Report

Technical Report

TR-77-1942-8

Prepared for:

Management Information and Data Systems Division
Environmental Protection Agency
Washington, D.C. 20460

Contract No.: GS-03S-46908

December 14, 1977

Submitted by:

informatics inc
6000 Executive Boulevard
Rockville, Maryland 20852
(301) 770-3000 Telex: 89-521

TABLE OF CONTENTS

			PAGE
SECTION	1	INTRODUCTION	1-1
	1.1	PROJECT PURPOSE AND OBJECTIVES	1-1
	1.2	INFORMATICS ROLE	1-2
	1.3	OVERALL REPORTS ORGANIZATION	1-2
	1.4	ORGANIZATION OF THIS REPORT	1-3
SECTION	2	STUDY METHODOLOGY	2-1
	2.1	INTRODUCTION	2-1
	2.2	BASELINE WORKLOAD	2-1
	2.3	PROJECTED WORKLOAD	2-2
SECTION	3	CURRENT TELECOMMUNICATION WORKLOAD	3-1
	3.1	INTRODUCTION	3-1
	3.2	WORKLOAD FACTOR DEFINITIONS	3-1
	3.3	EPA TELECOMMUNICATIONS NETWORK RATIONALE	3-2
	3.4	CURRENT TELECOMMUNICATIONS WORKLOAD ANALYSIS	3-3
SECTION	4	PROJECTED TELECOMMUNICATIONS WORKLOAD	4-1
	4.1	INTRODUCTION	4-1
	4.2	ALTERNATIVE SCENARIOS	4-1
	4.3	PROJECTED WORKLOAD	4-2

TABLE OF CONTENTS (Continued)

			PAGE
SECTION	5	MAJOR CONCLUSIONS OF THE STUDY	5-1
	5.1	TRENDS IN TELECOMMUNICATIONS USAGE	5-1
	5.2	TECHNOLOGICAL TRENDS	5-3

SECTION 1

INTRODUCTION

1.1 PROJECT PURPOSE AND OBJECTIVES

The purpose and objectives of the Environmental Protection Agency (EPA) Automated Data Processing (ADP) planning activities are to obtain the most cost-effective computing/telecommunications resources to meet EPA's computing requirements for the 1981 through 1990 time period. EPA has developed a comprehensive plan which closely follows the Office of Management and Budget (OMB) Circular A-109 (Major System Acquisition) process. The EPA plan addresses the following:

- Detailed system study, with total management participation, to establish the short and long term ADP needs, including computing, telecommunications and conversion requirements
- Development of an ADP acquisition strategy to obtain the necessary computing/telecommunications resources, including the detailed plan for evaluation of each step in the process
- Development of a Request for Proposal (RFP) to develop alternative system design concepts to meet the EPA needs; includes multiple awards for competitive concepts
- Development of an RFP to demonstrate the selected system concepts to reduce risk and to determine total cost
- Procurement of the required resources and services which provides the greatest benefit to EPA; this will include both conversion of all existing applications and operation of the new system

1.2 INFORMATICS ROLE

EPA selected Informatics to perform the detailed system study, which identifies the current and projected ADP requirements for the period 1981 through 1990. The study resulted in the following four documents:

- Phase I Final Report, dated April 8, 1977, which presents a detailed methodology and plan for conducting the ADP Requirements Analysis Study and for making the long-term projections of requirements
- Phase II Final Report Consolidated Systems Study, dated December 14, 1977, which presents the detailed current EPA computing workload for each organization within EPA and estimates of the workload for the years 1979, 1981, 1985 and 1990 based on projected changes in mission, programs and ADP usage
- Phase II Final Report Consolidated Telecommunications Study, dated December 14, 1977, which presents the detailed current telecommunications workload between the 10 EPA regional areas and the two computing facilities at Washington, D.C. and Research Triangle Park (RTP) and the projected changes in that workload for the years 1979, 1981, 1985 and 1990
- Phase II Final Report Conversion Study, dated December 14, 1977, which presents the impact and planning requirements for the agency in converting the existing ADP activities at the Washington Computing Center (WCC) and National Computer Center (NCC) facilities to either compatible or non-compatible equipment

1.3 OVERALL REPORTS ORGANIZATION

The final reports of the systems study are presented in the following manner:

Consolidated Systems Study Report

- Volume I - Executive Management Summary
- Volume II - Detailed Report
- Volume III - Appendices

Consolidated Telecommunications Study Report

- Volume I - Executive Management Summary
- Volume II - Detailed Report
- Volume III - Appendices

Conversion Study Report

- Volume I - Final Report

1.4 ORGANIZATION OF THIS REPORT

This report is Volume I, the Executive Management Summary of the Consolidated Telecommunications Study. This report is organized as follows:

- Section 1 - Introduction. A summary of the project's purpose and objectives; report content and report organization
- Section 2 - Study Methodology. A summary of the study approach, data gathered, and projections of future ADP workload
- Section 3 - Current ADP Workload. A summary of organizational missions and supporting ADP workload
- Section 4 - Projected ADP Workload. A summary of organizational and mission changes and projected workload
- Section 5 - Major Conclusions of the Study. A summary of macro influences which will affect future ADP usage

SECTION 2

STUDY METHODOLOGY

2.1 INTRODUCTION

The methodology used in the performance of this study consisted of the following tasks:

- Study of existing documentation
- Series of interviews with EPA management, ADP activity managers and computer service supplier personnel
- Verification of recorded data
- Analysis of data and conversion to quantitative terms
- Definition of mission responsibilities
- Projections of long-term requirements
- Documentation of total findings

2.2 BASELINE WORKLOAD

During Phase I, Study Familiarization, Informatics identified approximately 190 computer systems and ADP activities from the FY 1977 EPA Zero Base Budget (ZBB) submission. This represented approximately 80 percent of the total timesharing funds projected for use in 1978. A visitation program was established to investigate these systems and other ADP activities at the regional offices, laboratories and headquarters organizations. The interview process identified and documented in excess of 250 ADP activities and documented over 200 interviews with EPA management at all levels. In addition, Informatics visited the two primary computing facilities and identified the existing workload of each ADP activity. These data were then extrapolated to a full year's data and averaged to obtain a typical monthly workload.

2.3 PROJECTED WORKLOAD

The interview process with the ADP managers identified the changes to be made in the existing systems and obtained the projections of the ADP manager for the 1979 period. These changes were applied to the 1977 baseline data to obtain the 1979 values.

The EPA management interview results were converted to quantitative terms and presented as a set of projection factors for each organizational element. These values represented changes in ADP usage, mission and programs and overall EPA growth. These factors were then applied to the 1977 baseline and added to the values for 1979, 1981 and 1985, respectively.

Informatics collected detailed data from each of the computer facilities (WCC and NCC) regarding telecommunication workload by account number. In the case of WCC connect hours, both high and low speed were presented by user initials, and therefore, they could be converted to telephone area code and zip code. NCC data was identified by terminal which permitted the identification of telephone area code and zip code. Connect hours and transmission volumes were then identified for each activity at each area and zip code.

These data were then summarized by region and the two computer facilities at Washington and RTP.

SECTION 3

CURRENT TELECOMMUNICATION WORKLOAD

3.1 INTRODUCTION

This section presents the current year (1977) telecommunication workload from the user locations to and from the computer time-sharing facilities at the Washington Computer Center (WCC) in Washington D.C. and the National Computer Center (NCC) at Research Triangle Park (RTP), North Carolina. The workload is presented in terms of millions of characters transmitted per month. The workload is organized by major geographical areas corresponding to the EPA computer facilities and the other user locations within the ten regional offices.

3.2 WORKLOAD FACTOR DEFINITIONS

Telecommunication workload was developed on an individual ADP activity level at each location and summarized by the ten geographic regions of EPA, and by the two Washington and RTP metropolitan areas. Values were based on computer utilization reports for seven months at WCC and NCC. Data were averaged to obtain a typical month's workload. Volumes II and III of this report series provide detailed data by each individual telephone area code and zip code, but detailed reports by individual activity will be available on microfiche. Detailed listings contain terminal connect hours. input and output transaction volumes; and input and output character volumes for high and low speed transmission.

3.3 EPA TELECOMMUNICATIONS NETWORK RATIONALE

The EPA telecommunication network has been developed to provide ADP services to the geographically dispersed organizational units for the two primary computing facilities at WCC and NCC. Through the use of terminals, all locations remote to the computer sites have been able to operate ADP systems on an equal basis, subject to the connecting line speed and terminal type employed. The rationale for the current telecommunications network design is attributed to the geographically dispersed EPA organization, the current use of ADP by these remote locations, and the current network technologies.

Within EPA, the headquarters activities are all located in Washington, D.C. while ten regional offices serve local needs more readily. EPA has also obtained from other agencies and departments some laboratory facilities which are geographically dispersed to permit adjacency to project testing areas. Some laboratories are clustered at Cincinnati and Research Triangle Park. This entire organization has developed in response to the programs and missions contained in the initial and subsequent legislative mandates, and in keeping with the president's policy of decentralization.

The field use of ADP consists of local batch, remote batch, and conversational activities. Large volumes of data are entered into the system from field locations to support national systems, such as STORET. Field offices also use data from these national systems to support local activities. More recently, EPA has installed mini-computers to satisfy local data processing needs and as terminals. This has created the need to improve the telecommunication network with

more high speed lines for transferring of data. EPA has expanded the type of terminals used by remote locations to include graphics terminals.

The current network has front-end processors at RTP and Washington, with a similar processor located at Denver, Colorado. This forms a three node network servicing both high and low speed requirements. High speed telecommunications support rates of 2000, 4800, 7200, 9600 or 19.2K baud for remote job entry terminals. Low speed telecommunications support interactive or conversational terminals at speeds under 2000 baud, predominantly 30 or 120 characters per second. The Denver communication processor and trunk lines provide back-up to the RTP/Washington line. FTS and other telecommunication services are employed outside of the WCC/NCC network for access to outside computer systems to and from EPA locations.

3.4 CURRENT TELECOMMUNICATIONS WORKLOAD ANALYSIS

EPA has been organized in response to programs and missions mandated by legislation. The geographic dispersion of regional offices, laboratories, and other facilities has been caused by the transfer of existing facilities from other agencies at the time EPA started in 1970, and by the need to decentralize research, monitoring, and assistance programs to the local level.

Surveys of current communications workload focused on data transmission traffic between WCC/NCC computing facilities and user locations in each of the ten regions in addition to the concentration of users at EPA headquarters in Washington, D.C. and at Research Triangle Park (RTP), North Carolina. The current communications

workload defined for these areas became the baseline for measuring future projected workload.

The following descriptions summarize the major ADP activities which impact on the current (1977) communications workload for each of the twelve geographic areas (ten regions plus Washington, D.C. and RTP). Figure 3-1 shows total communications volume for each geographic area.

- Washington, D.C. Geographic Area. Major ADP activities supporting programs at EPA headquarters center on national data bases for water quality, pesticides, grants control, water supply, and enforcement monitoring. Support activities for property, personnel, and financial management are also heavily utilized. Various economic analysis, technology assessment, modeling, and statistical systems support activities in programs for noise, solid waste, radiation, toxics, and research and development

- Research Triangle Park Geographic Area. Major ADP activities at RTP involve the national air quality data base and a diversity of research programs at the RTP laboratory complex. The four laboratories (ESRL, IERL, HERL, and EMSL) are concerned with studies in air contaminants, air quality, pesticides, and pollution control networks and operate ADP systems in data collection, modeling, statistical analysis, technology and environmental assessment, and monitoring activities

- Region I Geographic Area. Major ADP activities for the regional office in Boston and the states of Maine and Vermont are involved with water quality monitoring and planning functions utilizing STORET. Other regional office systems are in programs for pesticides, air quality, compliance, enforcement, grants control, and administrative support. The Environmental Research Laboratory (ERL) at Narragansett, Rhode Island operates ADP systems in ocean disposal,

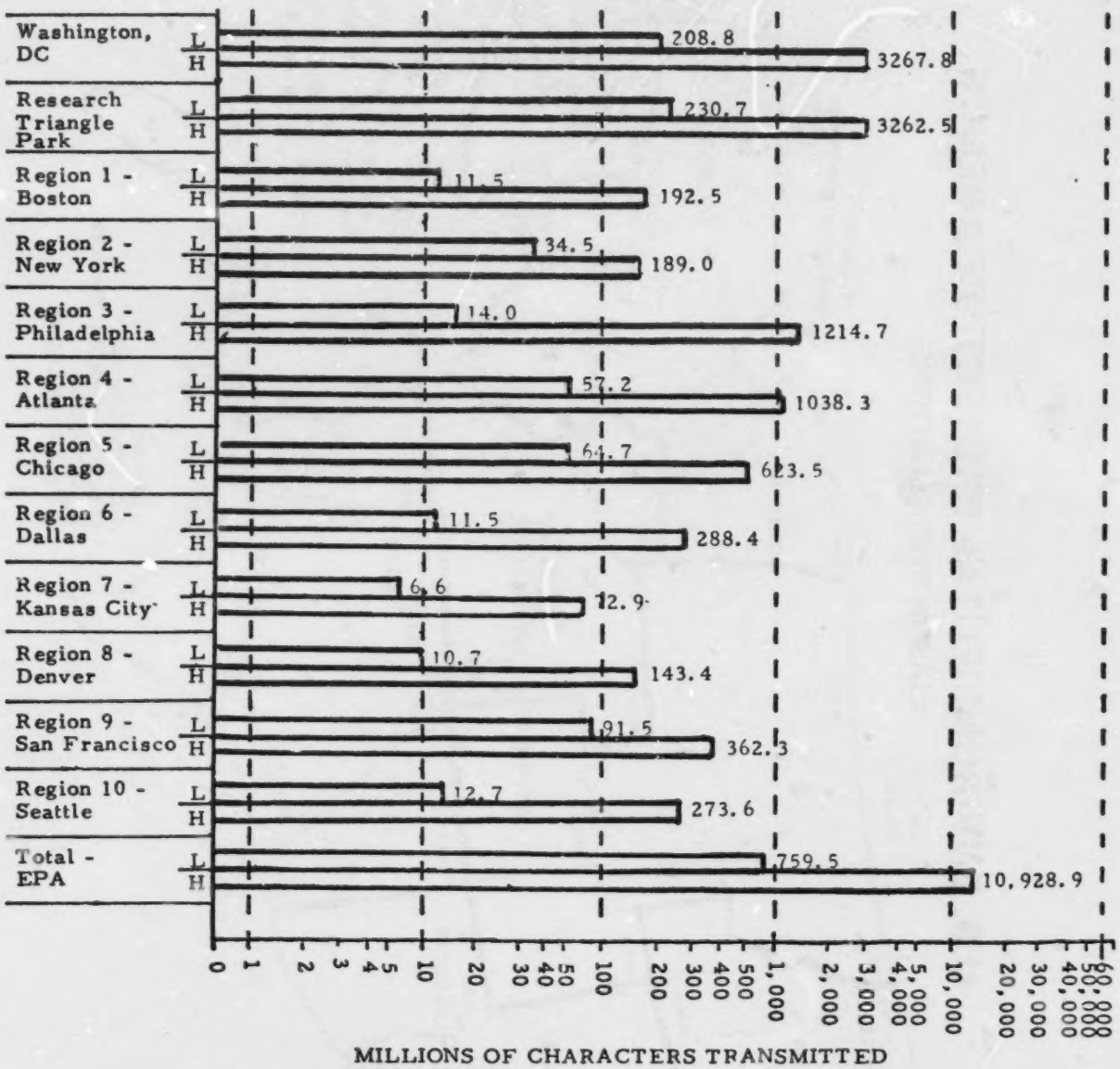

Figure 3-1. Total EPA Communications Workload - 1977

Figure 3-1.1. Current Telecommunications Workload Distribution (in Millions of Characters Monthly)

sample analysis and others in support of marine estuary studies

- Region II Geographic Area. Water quality systems utilizing STORET are operated by the New York regional office and the states of New York and New Jersey. The regional office also utilizes ADP for programs in pesticides, enforcement, grants control, compliance, administrative support, and air quality

- Region III Geographic Area. All national systems and several Regional systems are used by the Philadelphia Regional Office in support of the execution of the Region's environmental program responsibilities. In addition, non-EPA users are granted access to EPA systems (primarily STORET) to support their programs

- Region IV Geographic Area. The Atlanta regional office and the states of Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina and Tennessee are users of the STORET water quality data base for regional water quality monitoring and planning. The regional office also utilizes ADP for program support in compliance, air quality, grants control, and pesticides. Environmental Research Laboratories (ERL) at Athens, Georgia and at Gulf Breeze, Florida operate ADP systems for water planning models and coastal ecosystem studies

- Region V Geographic Area. Water quality monitoring and planning functions are performed with the STORET system by the Chicago regional office and the states of Minnesota, Wisconsin, Michigan, Illinois, Indiana and Ohio. Regional office programs impacting ADP and communications workload also include compliance, grants control, pesticides, and air quality systems. A complex of four ORD laboratories at Cincinnati, Ohio, (MERL, IERL, HERL and EMSL) operate ADP systems in studies on water supply, hazardous waste, pollution control, pollutant health effects, and quality assurance standards for data collection activities. ERL facilities at Duluth, Minnesota and Grosse Ile, Michigan use ADP and the

STORET system in support of Great Lakes studies. The Office of Mobile Source Air Pollution Control in Ann Arbor, Michigan utilizes WCC for general ADP support functions

- Region VI Geographic Area. The regional office in Dallas, Texas and the states of New Mexico, Texas, Oklahoma, and Arkansas utilize the STORET system for regional water quality monitoring and planning functions. The regional office also utilizes national systems for compliance, grants control, pesticides, enforcement, and air quality monitoring. The ERL at Ada, Oklahoma operates ADP systems for water and waste disposal studies

- Region VII Geographic Area. All states in the region (Nebraska, Kansas, Iowa and Missouri) and the Kansas City regional office use the STORET system for water programs. The regional office makes use of national systems for pesticides enforcement, compliance grants control, and air quality

- Region VIII Geographic Area. The Denver regional office, the National Enforcement Investigation Center (NEIC) in Denver, and the states of Montana, North and South Dakota, and Colorado utilize the STORET water quality data base for water program support. The regional office and NEIC also utilize the national air quality data base at NCC for air quality monitoring and enforcement. The regional office makes use of national systems for compliance, grants, pesticides, and property management

- Region IX Geographic Area. The states of California and Arizona and the San Francisco regional office utilize STORET in water programs. Programs in pesticides, air quality, compliance and grants are supported by national ADP systems in the regional office. EMSL at Las Vegas, Nevada operates systems in air and water quality analysis studies

- Region X Geographic Area. The STORET water quality system is utilized by Idaho, Oregon, Washington and the Seattle regional office. The regional office also makes use of national systems in air quality, grants, compliance, enforcement, water quality modeling, solid waste and pesticides. The laboratory at Corvallis, Oregon (ERL) utilizes STORET for water research programs

SECTION 4

PROJECTED TELCOMMUNICATIONS WORKLOAD

4.1 INTRODUCTION

This section presents the projected telecommunications workload for the 1979, 1981, 1985, and 1990 time frames. Each ADP activity impacting telecommunications that is expected by EPA management to continue during this period is included plus those new activities scheduled for implementation. Termination of those activities with life cycle end dates during the period through 1990 have also been factored into the projections. Changes in missions, programs, and ADP activities caused by legislation and evolvement of regional and state operations are analyzed by describing the forces behind the projected ADP and telecommunications growth rates. Graphs are included to present the projected workload growth for EPA in total and each of the geographic areas.

4.2 ALTERNATIVE SCENARIOS

Projected growth rates are presented at three levels which coincide with the three future scenarios discussed in management level interviews during the ADP survey:

- Scenario I. This is considered to be equivalent to today's level of activity and growth within the agency, and includes the viewpoint of the present administration, current economic outlook, energy programs, and public demands for environmental safeguards
- Scenario II. This considers that conditions of Scenario I will be augmented by increased public demand and legislative actions for environmental safeguards, potentially caused by increased public awareness of environmental problems and some pollutant or toxic substance disasters of national prominence and magnitude

- Scenario III. This considers the situation where shortage of critical resources such as energy, food, or water would impact agency programs with potential secondary concerns for the environment and high priorities for production of life-support resources

Discussions at the AA and DAA level focused on these three scenarios in terms of overall agency impact and effect on individual programs and ADP budgets. Management viewpoints and predictions were quantified and applied to the growth rates of individual ADP and telecommunications activities. After EPA review of the projection values, workload growth rates were finalized and computer processed. This process resulted in the three levels of future telecommunications growth presented in this section.

4.3 PROJECTED WORKLOAD

Telecommunications workload for projected future periods through 1990 is expressed in the same values used for the current workload in Section 3, i.e., in volume of characters transmitted per month between user locations and WCC/NCC computing facilities. Future workload has been computed for the milestone years 1979, 1981, 1985 and 1990. This was performed in accord with the management level survey estimates that were quantified and used for projecting changes in total agency growth, program and mission levels, and changes in the rate of ADP utilization for each office.

Agency growth in communications workload will grow throughout the projected period to 1990 under Scenario I, with higher growth rates in the period between 1977 and 1981. Sharper increases in the near term will be caused by the implementation of new programs in toxics, water supply, and solid waste, and by the impact of these programs on existing activities in pesticides, water, and enforcement. The continuing trend to decentralization will further the distribution

of communications workload to the regions and states, primarily in water, air, and enforcement programs.

As decentralization continues and more regions gain increased local ADP capability, the communications growth curve is expected to rise less rapidly. The use of national data bases will continue to expand with cross-media programs such as toxics forcing increased use of shared data base concepts, but the maturation of new programs and more state responsibility in the traditional air and water programs will be offsetting factors in communications workload growth.

Growth in the Washington, D.C. area for EPA headquarters is expected to follow the general pattern of higher growth in the period to 1979 as toxics and other new programs are implemented. More moderate but continued growth beyond 1979 will be caused by continuing trends in the states and regions for more intensive use of national water and compliance data bases, offset to a certain extent by decentralized ADP capability.

The laboratories will continue to have a heavy impact upon communications workload as most of these facilities maintain growth rates of the past and some increase growth significantly under research programs in chemical toxics and other health impact areas, quality assurance standards, energy related studies, and more intensive water programs such as in the Great Lakes. New legislation will be a continuing factor in research priorities, such as in radiation. The laboratories are heavy users of minicomputers and this trend will continue, but the need for large scale capability for modeling, statistical analysis, and other large volume processing will continue to increase communications workload.

Scenario II and higher demands for environmental programs would tend to intensify the growth rates presented for Scenario I, par-

ticularly in health effects programs and associated standards development, enforcement, and research. The decentralization trend to regions and states would increase as more local control efforts would be stressed. The impact upon communications workload would be high, more so in the early years before much local ADP capability was available at the local level.

Scenario III would selectively reduce lower priority programs in local assistance and technology development, but the overall impact upon communications would not be as great as the effect upon other elements of agency program budgets. The trend to decentralization would be slowed and research programs would be lengthened, with corresponding reductions in the rate of ADP and communications workload growth.

Figures 4-1, 4-2, and 4-3 illustrate projected EPA growth rates by geographic area for each of the three future scenarios.

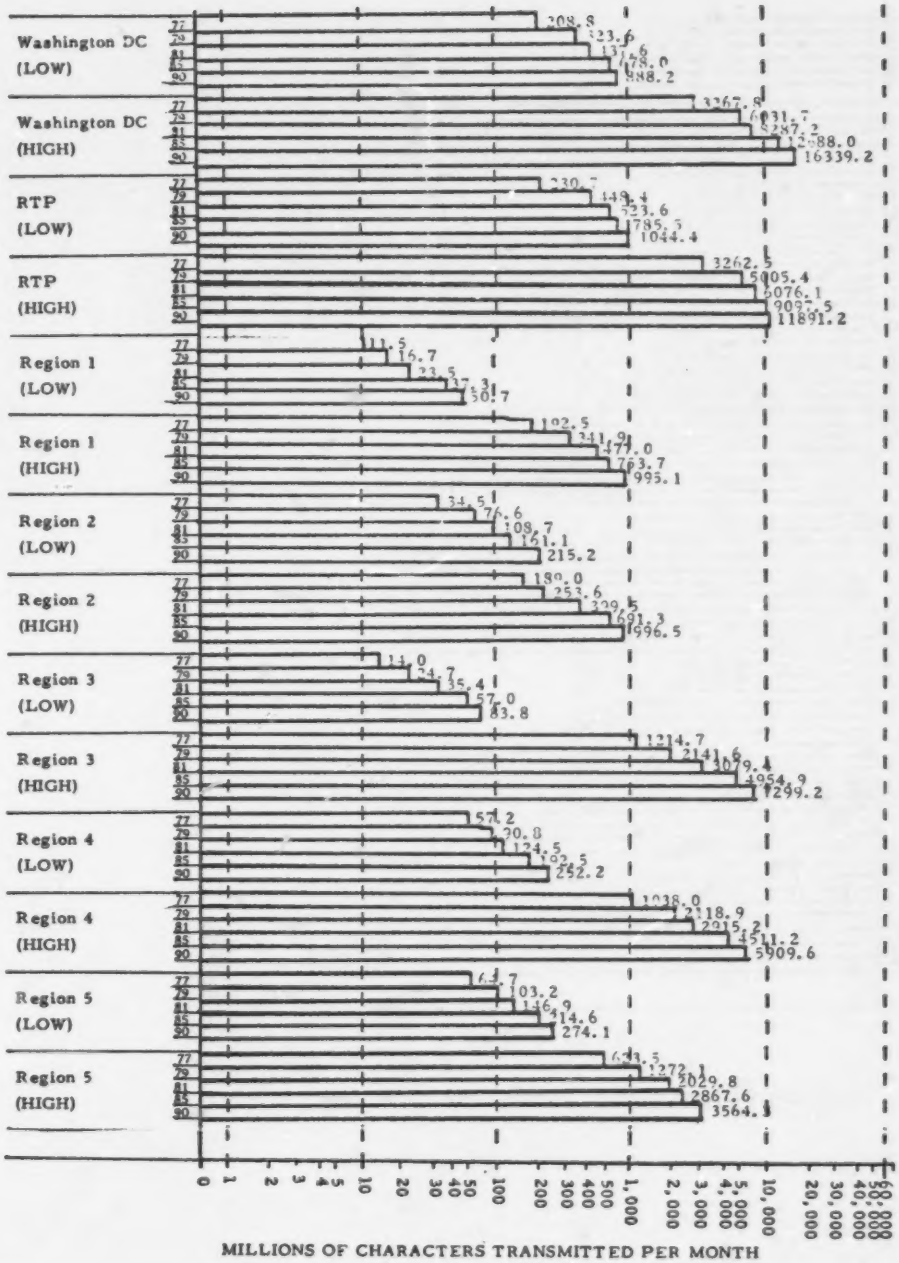

Figure 4-1. Total EPA Communications Workload Scenario 1

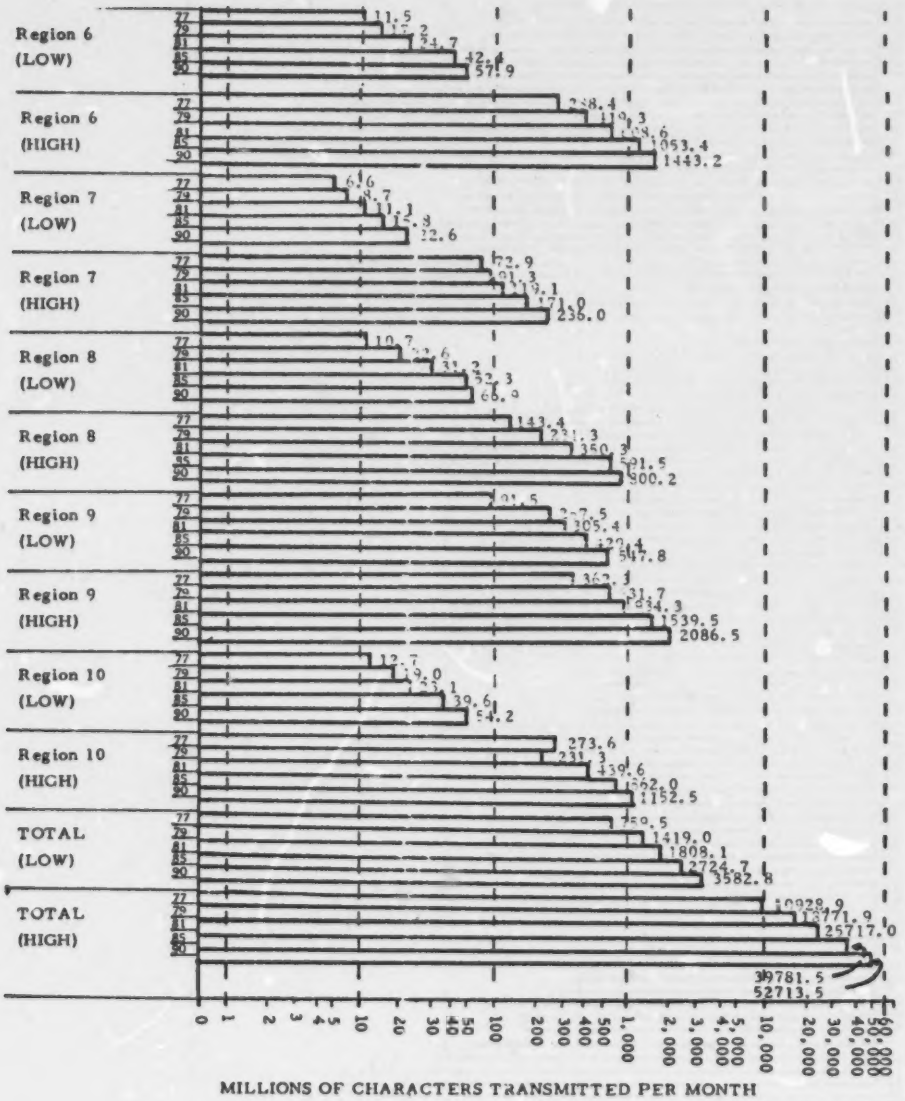

Figure 4-1. Total EPA Communications Workload (Continued)

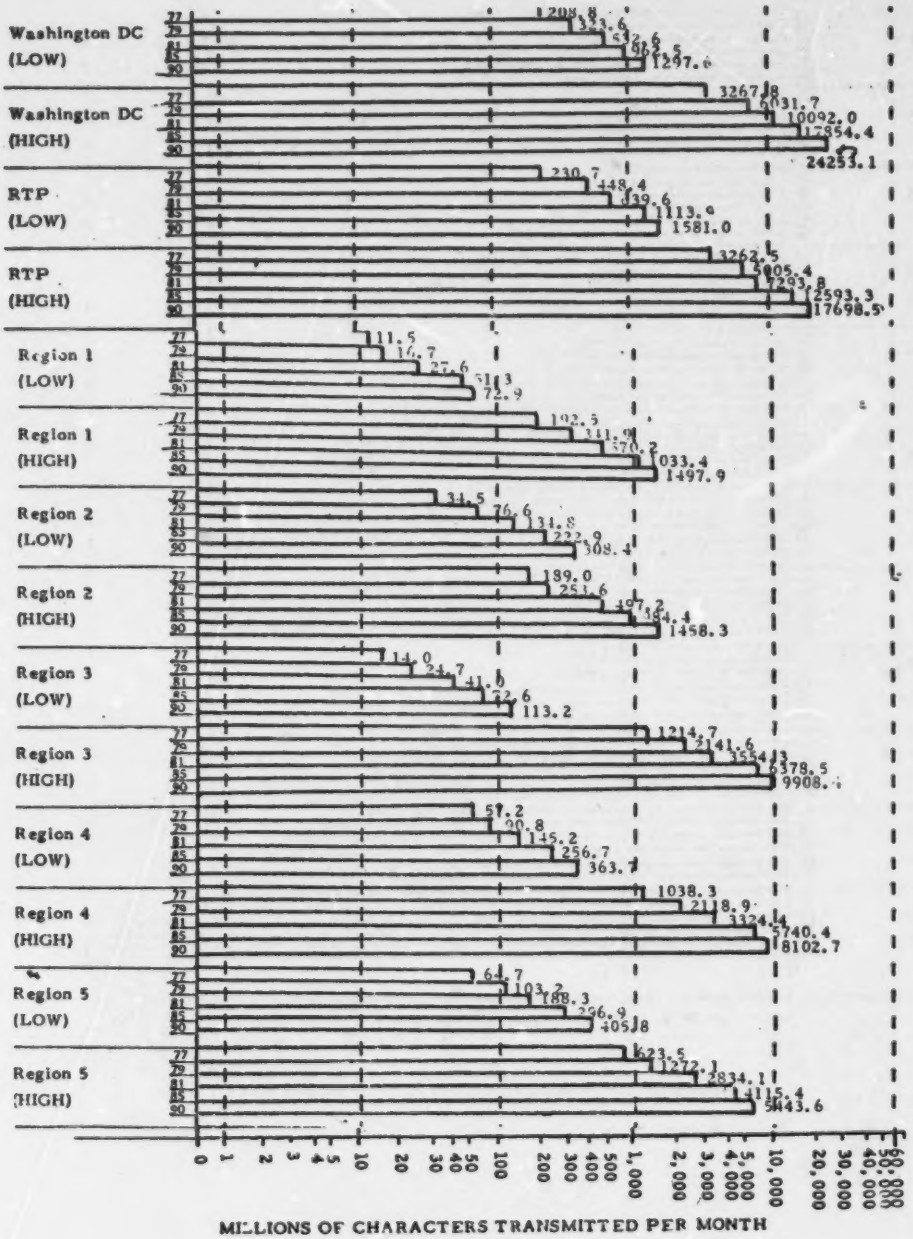

Figure 4-2. Total EPA Communications Workload Scenario 2

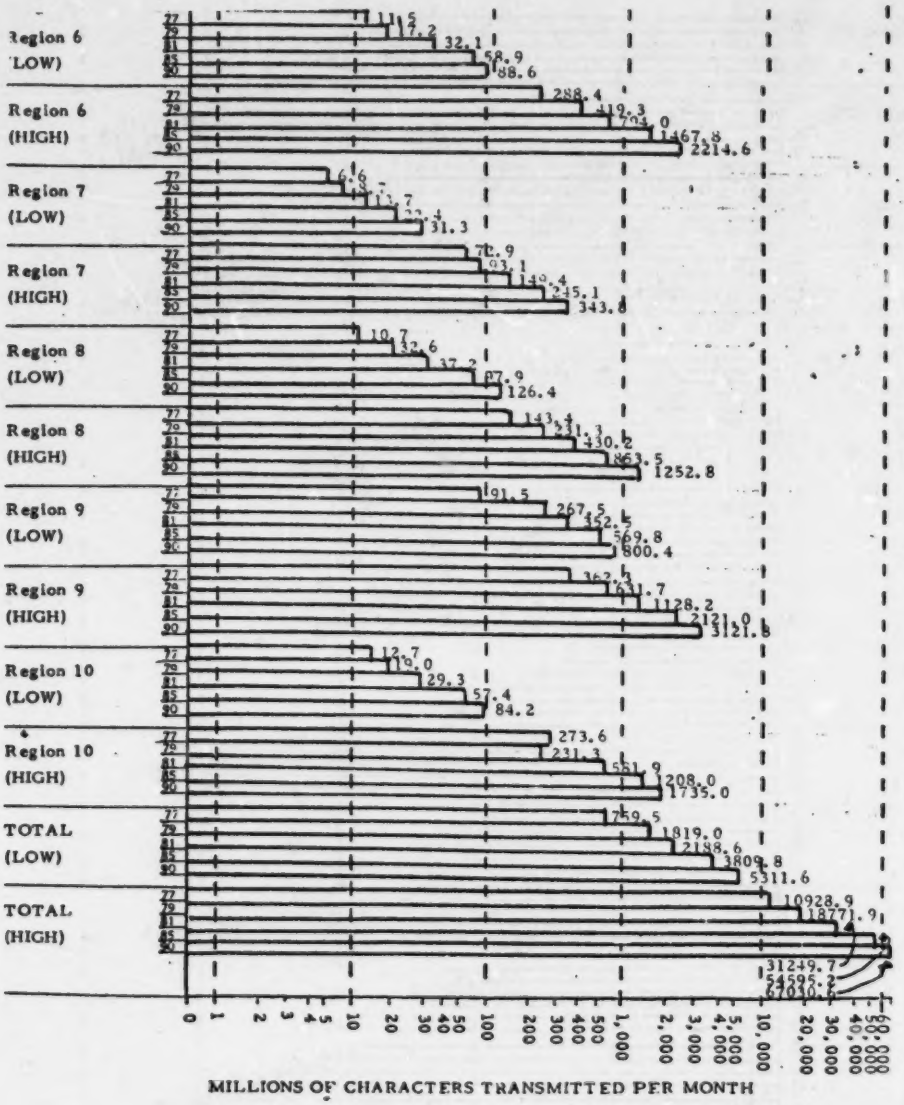

Figure 4-2. Total EPA Communications Workload (Continued)
Scenario 2

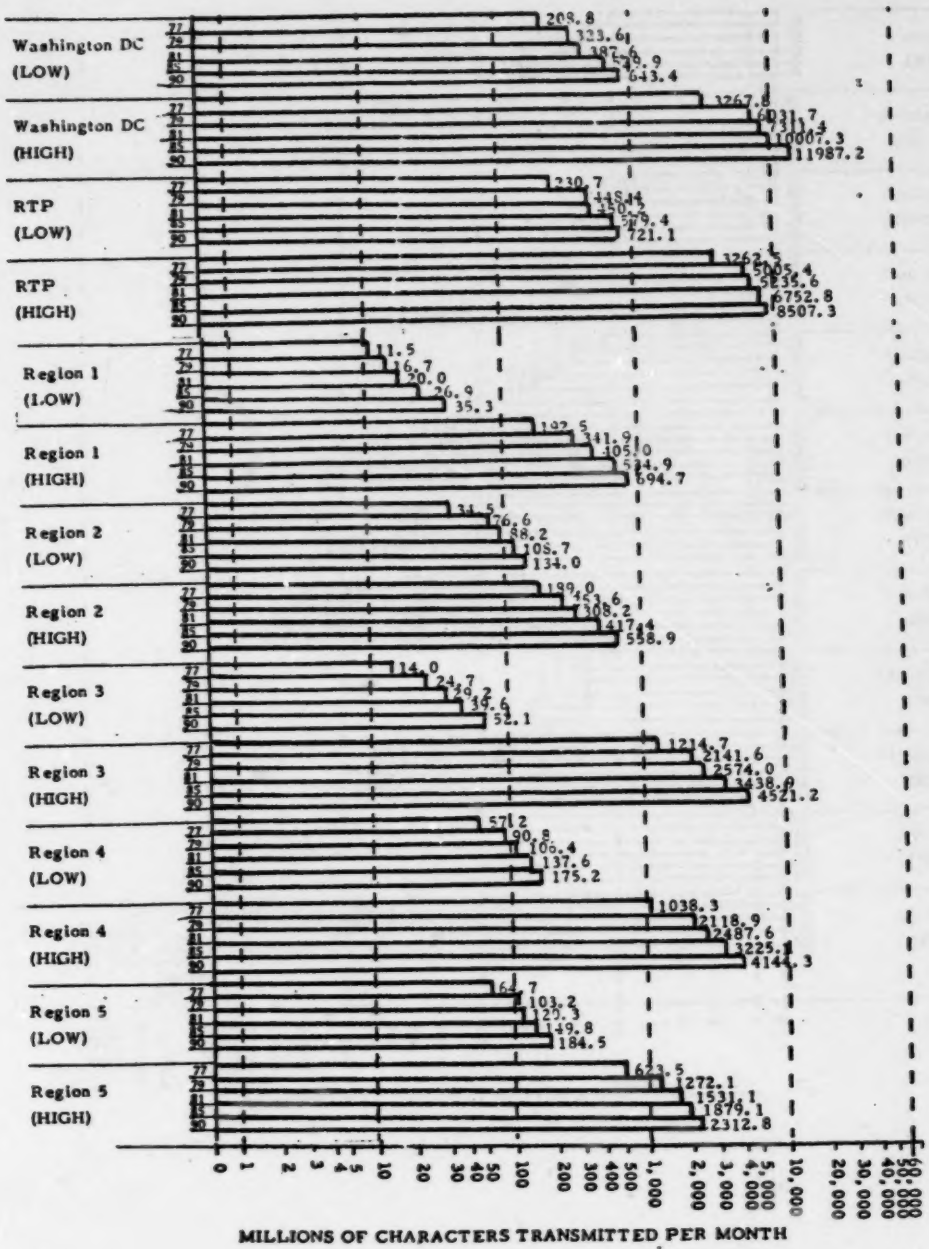

Figure 4-3. Total EPA Communications Workload Scenario 3

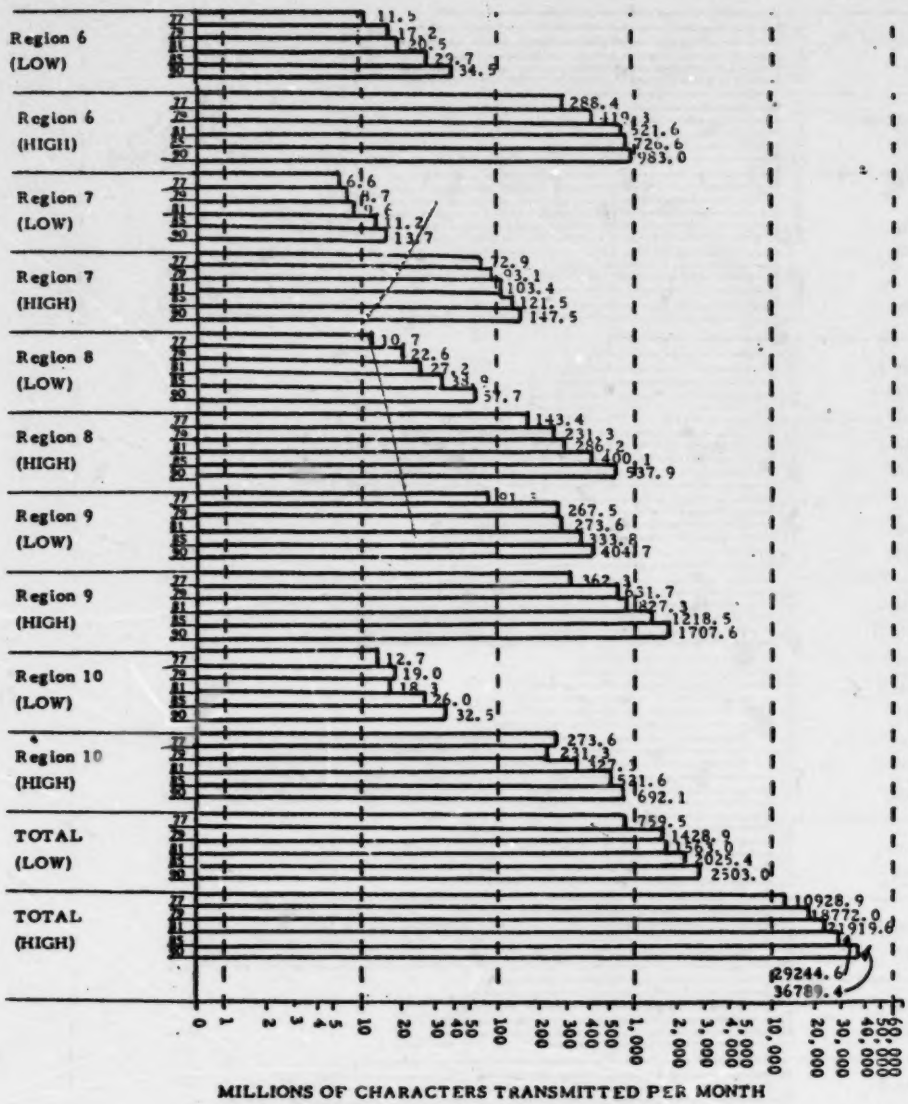

Figure 4-3. Total EPA Communications Workload (Continued)
Scenario 3

SECTION 5

MAJOR CONCLUSIONS OF THE STUDY

5.1 TRENDS IN TELECOMMUNICATIONS USAGE

The telecommunications workload has been projected over the period through 1990 in line with EPA management expectations for overall agency growth rates, program and mission priorities, and uses of ADP in support of program operations. Additional factors involving trends in the use of ADP, technological trends in telecommunications capability, and external influences upon the agency have also been considered.

All factors considered, the use of telecommunications will continue in parallel with growth in ADP utilization, with certain areas experiencing more rapid growth. Factors influencing increasing telecommunications use rates include the following:

- EPA management views of the agency's future are toward a slightly more favorable growth pattern than in the past, particularly in higher priority areas such as toxics and other health risk areas. Programs of lower priority, which may be influenced by future budget pressures and changes in agency direction, will not impact ADP operations and the use of telecommunications as much as other budget elements such as personnel levels and outside contracting

- Priority programs such as toxics will place increased emphasis upon cross-media interfacing and improved data transfer within EPA. The use of multiple data bases by a variety of users in standards development, economic studies, enforcement, and research will tend to increase telecommunications workload proportionately

- Trends already in motion toward decentralization of program responsibility to states and regional offices will tend to place increased emphasis upon national data base facilities as a central repository of large

volume data, and large-scale telecommunications networks as a means of providing access

- Future ADP efforts are expected to increasingly stress data analysis and modeling for guidelines development, and economic analysis for risk and cost benefit studies. These projects require large scale computing capability and access to multiple-media data bases most readily available in a telecommunications-oriented ADP system

Another area of significant impact upon telecommunications is the future role of distributed processing or the use of minicomputers in many of the agency offices, regions, and laboratories. The impact of these localized systems upon telecommunications varies with the manner in which they are employed in the overall agency ADP strategy. One approach would support the entry of regional data to a centralized data base and the retention of local data at the user (regional) facility. All interaction of users with local data bases would then be "distributed" at the local level and telecommunications with the central data base would be limited to a small number of requests for data across regional lines.

Another approach more in line with current trends treats the local minicomputer system as a front end to centralized data base systems. Data collection and preprocessing or refinement of data takes place on the minicomputer with lower volumes of "clean" data transmitted to the central system. Interaction with the data base then occurs on the central system, except for occasions when use of more detailed data at the regional level is required.

Regardless of the future role of distributed processing in agency network designs, the need for telecommunications capability will be increasingly important as decentralization and cross-media programs such as toxics grow. The need for access to all data bases for efforts in research, economic analysis, enforcement, and policy

determination can only be satisfied for a geographically dispersed organization such as EPA through the use of a responsive network that places all users on an equal footing.

5.2 TECHNOLOGICAL TRENDS

Telecommunications technology has been rapidly advancing in recent years due to more organizations entering the field. Communication networks have evolved as major elements of a system with services for a broad range of terminal and processor equipment and a broad range of users. Supporting these networks are improved common carrier facilities and more sophisticated network concepts. Satellite communications with advanced ground base techniques are available to support improved data rates and reliability. In the early 80's three of four major vendors will have fully operational shared networks using satellites, generating additional improvements and expansion of the number of ground stations.

Telecommunication user demands have expanded to a point where previous capabilities could not meet them. Dedicated networks have grown to become more complex and less cost effective. Shared networks have enjoyed an exceptional growth rate, thus creating the demand for better and faster transmission of data. Concepts such as packet switching fully support these shared networks.

Terminal technology has expanded at a very rapid rate, with minicomputers and larger scale computers now being a part of most networks. Intelligent and graphics terminals are now commonplace, creating the need for more communication lines and higher speeds of transmission.

EPA has grown along with this trend and now has minicomputers at some regions, intelligent and graphics terminals in the laboratories, and a wide variety of standard terminals in all locations.

The vast majority of EPA ADP workload is performed within the two centralized computer facilities in Washington, D.C. (WCC) and Research Triangle Park (NCC). Field minicomputers interface with this hardware by preprocessing input data and generating output reports from data maintained in the central facilities. Most organizations within EPA have some type of terminal connected to one or both of the facilities. Graphics display terminals are rapidly being added to the EPA inventory. Other field locations are performing feasibility studies to obtain local minicomputers. These expanding demands will create the need for special considerations to be given to the telecommunications networks proposed as a part of future systems. Accuracy, timeliness and reliability will be key factors in any final decision.